

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method of obtaining quality indicators for an objective assessment of a degraded or output video signal with respect to a reference or input video signal by quantifying the strength of edges or signal transitions in both the input and the output video signals using edge or signal transition detection, said method comprising:

a first main step of generating image features of the input and output video signals, the image features including edge information-, and

a second main step of determining quality indicators from the generated image features,

~~characterised in that~~ characterized in that

the first main step includes the steps of:

a) detecting edges in the input and the output video signals, respectively (25, 27), and

b) calculating the edginess of the input and the output video signals, providing input and output edge signals (26, 28); and

the second main step includes the steps of:

c) establishing introduced edges in the output edge signal by comparing the input and output edge signals of corresponding parts of the input and output video signals (29), introduced edges being edges which are present in the

output edge signal and are absent at corresponding positions in the input edge signal;

d) establishing omitted edges in the output edge signal by comparing the input and output edge signals of corresponding parts of the input and output video signals (33), omitted edges being edges which are present in the input edge signal and are absent at corresponding positions in the output edge signal;

e) obtaining normalised values of the introduced edges relative to the output edge signal adjusted by a first normalisation factor (30);

f) obtaining normalised values of the omitted edges relative to the input edge signal adjusted by a second normalisation factor (34);

g) calculating a first quality indicator by averaging the values obtained in step e) (31, 32); and

h) calculating a second quality indicator by averaging the values obtained in step f) (35, 36).

Claim 2 (currently amended): A method according to claim 1, ~~characterised~~ characterized in that

i) the input and output edge signals are provided as corresponding unipolar signals;

j) the input and output edge signals of corresponding parts of the input and output video signals are aligned;

k) a bipolar distortion signal is established by difference building of the aligned input and output edge signals, and

l) the introduced and omitted edges are established from the respective polarities of the distortion signal.

Claim 3 (currently amended): A method according to claim 1, characterized or claim 2, characterised in that the first and second normalisation factors are set in accordance with the characteristics of the video signals.

Claim 4 (currently amended): A method according to claim 3, characterised-characterized in that the first and second normalisation factors comprise a constant part set in accordance with luminance and chrominance values of the video signals.

Claim 5 (currently amended): A method according to claim 3, characterized or 4, characterised in that the first normalisation factor comprises a variable part obtained from maximum characteristic edge values of the video signals.

Claim 6 (currently amended): A method according to ~~any of the previous claims,~~ characterised claim 1, characterized in that the input and output edge signals are provided from Sobel filtering.

Claim 7 (currently amended): A method according to claim 6, characterised-characterized in that the input and output edge signals are provided from improved or smeared Sobel filtering.

Claim 8 (currently amended): A method according to ~~any of the previous claims,~~ characterised claim 1, characterized in that the first and second quality indicators are obtained for either luminance and/or chrominance signals of the input and output video signals.

Claim 9 (currently amended): A method according to claim 8,
~~dependent on claims 5 and 7, characterised~~characterized in
that for the luminance signals the constant part of the first
normalisation factor is in a range between 15 and 30,
preferably 20, the constant part of the second normalisation
factor is in a range between 5 and 15, preferably 10, and the
variable part of the first normalisation factor is in a range
between 0.3 and 1, preferably 0.6, times the maximum value of
the luminance signal of the input and output video signals.

Claim 10 (currently amended): A method according to claim 9,
~~characterised~~characterized in that for the chrominance
signals the constant part of the first and second
normalisation factors is in a range between 5 and 15,
preferably 10.

Claim 11 (currently amended): A method according to claim 8,
~~9 or 10, characterised~~characterized in that of the first and
second quality indicators of each the luminance and
chrominance signals a weighted quality indicator is obtained,
and a Mean Opinion Score (MOS) is calculated from the
obtained weighted quality indicators.

Claim 12 (currently amended): A method according to
claim 11, ~~characterised~~characterized in that multiple linear
regression techniques are used for weighing of the respective
first and second quality indicators.

Claim 13 (currently amended): A method according to ~~any of~~
~~the previous claims, characterised~~claim 1, characterized in
that the normalisation factors and/or weighing of the quality

indicators are set from quality indicators obtained from subjective quality data and calculated quality data.

Claim 14 (currently amended): An arrangement for obtaining quality indicators for an objective assessment of a degraded or output video signal with respect to a reference or input video signal by quantifying the strength of edges or signal transitions in both the input and the output video signals using edge or signal transition detection, said arrangement comprising:

means for generating image features of the input and output video signals, the image features including edge information, and

means for determining quality indicators from the generated image features,

~~characterised in that~~ characterized in that

the means for generating image features include:

a) means (42, 43) for detecting edges in the input and the output video signals, respectively, and

b) means (42, 43) for calculating the edginess of the input and the output video signals, providing input and output edge signals;

and the means for determining quality indicators include:

c) means (45) for establishing introduced edges in the output edge signal by comparing the input and output edge signals of corresponding parts of the input and output video signals, introduced edges being edges which are present in the output edge signal and are absent at corresponding positions in the input edge signal;

d) means (46) for establishing omitted edges in the output edge signal by comparing the input and output edge signals of corresponding parts of the input and output video

signals, omitted edges being edges which are present in the input edge signal and are absent at corresponding positions in the output edge signal;

e) means (47) for obtaining normalised values of the introduced edges relative to the output edge signal adjusted by a first normalisation factor;

f) means (48) for obtaining normalised values of the omitted edges relative to the input edge signal adjusted by a second normalisation factor;

g) means (49) for calculating a first quality indicator (51) by averaging the values obtained in step e); and

h) means (50) for calculating a second quality indicator (52) by averaging the values obtained in step f).

Claim 15 (currently amended): An arrangement according to claim 14, ~~characterised~~characterized in that the edge detection and calculation means comprise Sobel filter means.

Claim 16 (currently amended): An arrangement according to claim 14, ~~characterised~~characterized in that the edge detection and calculation means comprise improved or smeared Sobel filter means.

Claim 17 (currently amended): An arrangement according to claim 14, ~~15 or 16,~~ implemented in digital processor means.

Claim 18 (currently amended): An Application Specific Integrated Circuit (ASIC) adapted to include means performing all the method steps of ~~any of claims 1 to 13~~claim 1, ~~or including the arrangement of any of claims 14-17.~~

Appl. No. (not yet known)

Preliminary Amendment dated November 14, 2003

Continuation Application of SN 09/601,902

Claim 19 (currently amended): Use of the method, arrangement
or ASIC according to ~~any of the previous claims~~claim 1, in
measuring the quality of video codecs.

Claim 20 (currently amended): Use of the method, arrangement
or ASIC according to ~~any of the claims 1 to 18~~claim 1, in
measuring the quality of video transmissions.

Claim 21 (new): An Application Specific Integrated Circuit
(ASIC) adapted to include the arrangement of claim 14.